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SUBJECTIVE IMPROVEMENT FOLLOWING TREATMENT WITH CARBAMAZEPINE (TEGRETOL) FOR A SUBPOPULATION OF PATIENTS WITH TRAUMATIC BRAIN INJURIES[1]

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Summary.—Over a 3-yr period, 19 patients who had sustained brain traumas during motor vehicle incidents and who exhibited abnormal scores for a dichotic word-listening task and Roberts' Epileptic Spectrum Disorder Inventory more than one year after the injury were recommended for treatment with carbamazepine (Tegretol). The psychiatric profile of these patients, as defined by the Minnesota Multiphasic Personality Inventory, was similar to the profile of patients from other studies who had displayed more objective improvement following this treatment. Of the 14 patients 12 who followed the recommendation retrospectively reported that within a few weeks after treatment they experienced marked reductions in the incidence of sudden confusion and depression, increased attention and focus and either elimination or attenuation of an aversive sensed presence. Such results suggest that many of the debilitating symptoms that persist for months to years after a traumatic brain injury may be electrical in nature rather than due to "psychological responses" and might be treatable by appropriate dosages of carbamazepine or other, e.g., Gabapentin (Neurontin) anti-epileptic compounds.

Roberts, Paulsen, Marchman, and Varney (1988) reported that 13 of the 16 patients who were treated with the antiepileptic drug carbamazepine (Tegretol), a derivative of iminodibenzyl related structurally to the antidepressant imipramine (Leppik, 1990), exhibited marked clinical and psychometric improvement. These patients who had sustained brain traumas had been diagnosed for years with multiple psychiatric difficulties yet had not responded to traditional medications for these diagnostic categories. In addition to grossly elevated profiles on the Multiphasic Personality Inventory (MMPI) these patients also showed impairments for dichotic word listening and evidence of the Epileptic Spectrum Disorder (Roberts, Gorman, Lee, Hines, Richardson, Riggle, & Varney, 1992). This disorder is associated with the endorsement of a multitude of subjective experiences (but without the motor manifestations) that are similar to those reported by patients having verified partial complex partial seizures with foci within the mesiobasal or cortical regions of the temporal lobes.

The present study reports the retrospective experiences of patients following treatment with Tegretol more than one year after a closed-head inju-

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ry associated with motor vehicle incidents. All patients ($N = 19$; 11 men, 8 women) who displayed scores that were more than 2.5 standard deviations below the mean for a dichotic word-listening task (Persinger, 1995; Persinger & Richards, 1995) and 5.0 standard deviations above the mean for the Epileptic Spectrum Disorder Inventory (Roberts, *et al.*, 1988) were recommended for treatment with Tegretol beginning with a very low dosage of 100 mg/day for the first week and then increasing in 100-mg/day increments per week until the lower dosages recommended for verified epileptic patients had been approached or the symptoms attenuated. Of the 19 patients, 14 and their physicians complied. During subsequent interviews, one to two years after the treatment was recommended, 12 of these 14 patients who had complied reported that significant improvements had occurred within the first two months of treatment.

As a group, the patients attributed the increased concentration (described as "better focus" or "less distractibility"), decreased incidence of the aversive experiences associated with a sensed presence, and marked reduction in "sudden depression and confusion" to the Tegretol treatment (duration = 3 mo. to about 1 year). All but two patients, after discontinuing the treatment, reported no recurrence of the previous symptoms. Ten of the 14 patients had received imipramine or a selective serotonin reuptake inhibitor, such as fluoxetine or sertraline, before the treatment. These patients reported that those drugs had not affected their symptoms, while the effect of Tegretol was conspicuous. Three of the patients, who had been hospitalized for "psychosis" (primarily because of the psychiatrists' interpretation of the patients' sensed presence and auditory experiences) and administered haloperidol or chlorpromazine, reported that the symptoms had worsened during these medications. Research by Bureau and Persinger (1991) indicated that cholinergic rebound after administration of chlorpromazine exacerbated the probability of experimentally induced overt limbic seizures in rodents.

To discern if the pretreatment profiles of the Minnesota Multiphasic Personality Inventory, MMPI–168 (Vincent, Castillo, Hauser, Zapata, Stuart, Cohn, & O'Shanick, 1984) for these 19 patients were different from patients (n=18, 11 men, 7 women) who were assessed during the same period and whose dichotic word-listening scores were normal and scores on the Epileptic Spectrum Disorder Inventory were less than 2.5 standard deviations above the mean, one-way analyses of variance were performed between these two groups for scores on each of the 13 scales of the MMPI. The means and standard deviations for the criterion group and the reference group for Scale L was 51 ± 6 and 56 ± 10, Scale F 88 ± 14 and 60 ± 9, Scale K 46 ± 7 and 54 ± 9, Scale Hs 89 ± 10 and 63 ± 15, Scale D 88 ± 15 and 70 ± 15, Scale Hy 83 ± 9 and 68 ± 11, Scale Pd 78 ± 10 and 60 ± 15, Scale MF 52 ± 13 and 49 ± 12, Scale Pa 73 ± 16 and 60 ± 9, Scale Pt 85 ± 11 and 62 ± 14, Scale Sc

86 ± 20 and 60 ± 10, Scale Ma 76 ± 12 and 62 ± 11, and Scale Si 64 ± 11 and 58 ± 14, respectively. The group differences for all of the scales except for L, K, MF, Pa, and Si, were statistically significant [Fs (all dfs = 1,35) > 13.05) at $p < .001$].

Factor analyses (PA1 method), after varimax rotation, confirmed that the following scales loaded significantly ($r > .70$) on the same factor (eigenvalue = 7.00; 54% of the variance): F, Hs, D, Hy, Pd, Pt, and Sc. The mean and standard deviation for the factor scores for the criterion group and the reference group were −.6 (*SD*, .8) and .6 (*SD*, .8), respectively ($F = 22.55$, $p < .001$). For the criterion group the mean and standard deviations for the number of clinical scales ($n = 10$) whose T score had exceeded 70 was 6.6 ($SD = 1.9$), whereas the mean for the reference group was 1.8 (*SD*, 2.0; $F = 53.60$, $p < .001$; $\omega^2 = 60\%$ of the variance). However, the criterion group did not differ significantly ($p > .01$) from the reference group with respect to the Halstead-Reitan Impairment Indices (grand $M = .5$, $SD = .3$) or the time since the injury (grand $M = 3.6$ yr., $SD = 4.7$).

The grossly elevated MMPI profiles of patients who displayed elevated signs for the Epileptic Spectrum Disorder and deficient dichotic word listening were similar to the patterns reported by Roberts, *et al.* (1988). The self-reports of marked improvement with Tegretol after no improvement with traditional antidepressants or worsening of symptoms with antipsychotic drugs also supports the results of Roberts' research team. Although the limits of the present study are inherent within any retrospective analyses of subjective reports, both studies suggest that some of the debilitating behaviours that persist in some patients after brain trauma may be neuroelectrical in nature. This possibility encourages an alternative explanation to "psychological" or "learned helplessness" and indicates that treatment with the appropriate dosages of antiepileptic compounds may help solve the problem, which would be preferable to proliferation of pejorative labels for these patients' difficulties with adaptation.

Absence of motor movements and stereotyped spells yet a preponderance of intrusive and intense subjective experiences has been shown experimentally to be coupled along a continuum of electrical synchrony of activity between increased percentages of neurons within the matrix of labile neurons (Babb, Wilson, & Isokawa-Akesson, 1987). These primarily experiential phenomena appear to reflect a more spatially constrained occurrence of paroxysmal activity that does not access cortical motor centers and consequently is not manifested sufficiently to be discerned by traditional qualitative electroencephalographic criteria. Newer electrically attenuating compounds with fewer untoward side effects, such as Gabapentin (Neurontin), might be considered in the future for trials to help decrease this regional lability and reduce these distressing symptoms. Alternatively, transcerebral applications of

weak, complex magnetic fields whose temporal structures dampen the development of limbic seizures (Bureau & Persinger, 1995) might also be beneficial as direct interventions (Baker-Price & Persinger, 1996) or adjunctive additions to pharmaceutical treatment.

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